AUTOMATIC WATER GARDENING SYSTEM

ABSTRACT:

In this system, soil moisture sensor senses the moisture level of the soil. If soil will get dry then sensor senses low moisture level and automatically switches on the water pump to supply water to the plant. As plant get sufficient water and soil get wet then sensor senses enough moisture in soil. After which the water pump will automatically get stopped.

I have used a self made water pump in this system using 5 volt DC motor. I could use 12 volt water pump in the system but to operate this, it will require a relay module. So, to reduce all these hardware complexity, I made DC motor based water pump using diode, transistor and registers combined circuit which operates DC motor according to the Arduino code.

The program in the Arduino reads the moisture value from the sensor every 20 seconds. If the value reaches the threshold value, the program does the following three things:

1. It moves the servo motor horn, along with the water pipe fixed on it, toward potted plant, whose moisture level is less than the predetermined/ threshold level.
2. It starts the motor pump to supply water to the plant for a fixed period of time and then stops the water pump.
3. It brings back the servo motor horn to its initial position.

INTRODUCTION:

We all know that plants are very beneficial to all human beings in many aspects. Plants helps in keeping the environment healthy by cleaning air naturally and producing oxygen. Many people love to have plants in their backyard. But due to civilization and insufficiency of place many people used to grow plants in a mold or dirt, pot, and placed on the windowsill. This plant are dependent on conventional breeding – watering, and provide the right amount of sun

to sustain life and growth. In busy schedule of day to day life, many time people forget to water their plants and due to this plants suffers many disorders and ultimately died. In addition, the world's biggest problem in modem society is the shortage of water resources, agriculture is a demanding job to consume large amounts of water. It is very essential to utilize the water resources in proper way.

Thus, a system is required, to handle this task automatically. Automated plant watering system estimate and measure the existing plant and then supplies desired amount of water needed by that plant. It is minimizing the excess water use as well as keeping plants healthy. Explained in this section is a simple and exciting automatic plant watering system that you can build yourself in just a few hours. It is an Arduino based automatic plant watering system that uses a soil moisture sensor.

In this project I will be demonstrating Automatic Irrigation System with integrated temperature sensor which irrigates or waters your plants automatically. This system is best suited for drip irrigation technique.

A Moisture sensor is used to read the Moisture content of the soil. The LM35 Temperature Sensor reads the ambient temperature.

This System will help you to irrigate your backyard Garden or your Indoor Garden automatically and you need not worry about watering your favorite plants in your busy schedule.

Arduino UNO is the brain of this system and all the sensors and display devices are controlled by it.

The moisture sensor provides an analogue output, which can easily be interfaced with Arduino. In this project, two sensors can be connected to analogue pins A1, of the Arduino board. Each sensor has four pins (Vcc, Gnd, Ao and Do) available for interfacing with the Arduino board. Here, digital output pin (Do) is not used. The water pump is controlled by Arduino connected to digital pins 13.

SOFTWARE SPECIFICATIONS:

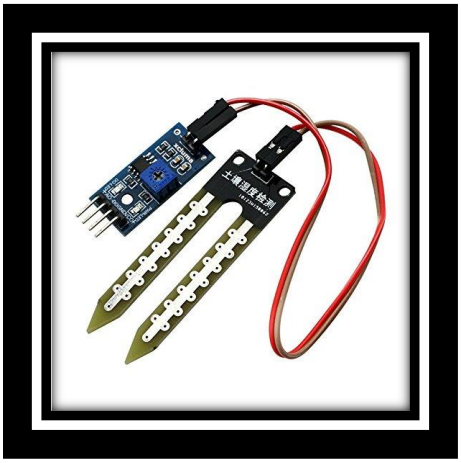
The program is written in Arduino programming language. The code is well commented and is easy to understand. Compile the code and upload it to the microcontroller, using Arduino IDE version 1.The sensor will calibrate by itself once it is kept in the soil and the threshold value will be shown on the serial monitor in Arduino. Serial debugging is available in this program. Comment out if you do not wish to use the serial monitor.

METHODOLOGY:

COMPONENTS USED IN PROJECT:

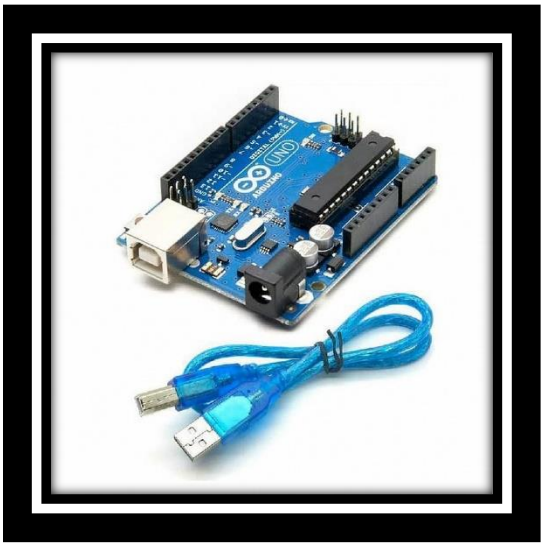
DC motor using water pump: I use DC motor to make water pump. DC motor has two leads one is positive and another one is negative. If we connect them directly to the Arduino board then it will damage the board.

Soil moisture sensor:



The soil moisture sensor consists of two leads that are used to measure volume of water content in soil. These leads allow the current to pass through the soil and in return calculates the resistance value to measure the moisture level. If there is more water in soil then soil will conduct less electricity, means more resistance value along with high level of moisture. In the same manner if there is less water in soil then soil will conduct more electricity, means less resistance value along with low level of moisture.

Arduino UNO:

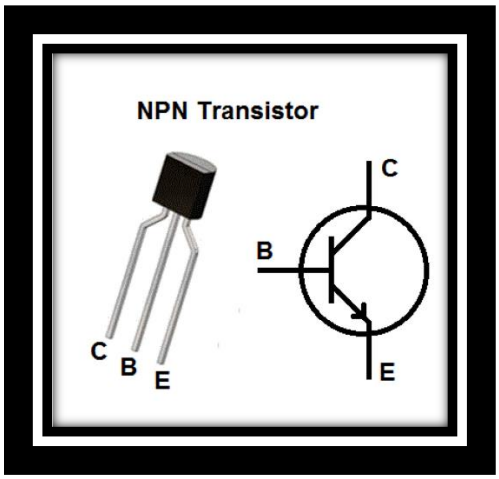


It is a microcontroller board based on the ATmega328P (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

1N4007-High Voltage High Current rated Diode:

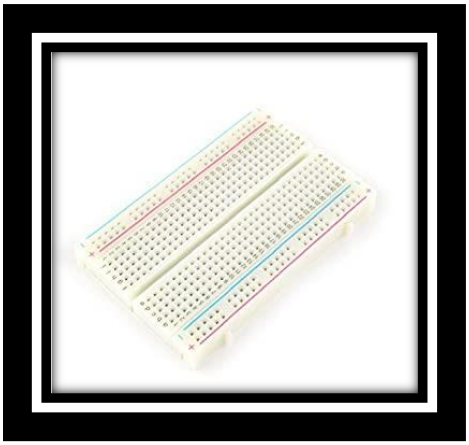
It can be used in any general purpose application where there is need of a general diode. The 1N4007 diode is built for working with high voltages and it can easily handle voltage below 1000V. The 1000mA or 1A average fwd current, 3W power dissipation with small size and lost cost also makes it ideal for wide variety of applications.

General purpose Transistor NPN:



The 2N2222 is a common NPN bipolar junction transistor (BJT) used for general purpose low-power amplifying or switching applications. It is designed for low to medium current, low power, medium voltage, and can operate at moderately high speeds.

Bread board:



A breadboard is used to make up temporary circuits for testing or to try out an idea. No soldering is required so it is easy to change connections and replace components. Parts are not damaged and can be re-used afterwards.

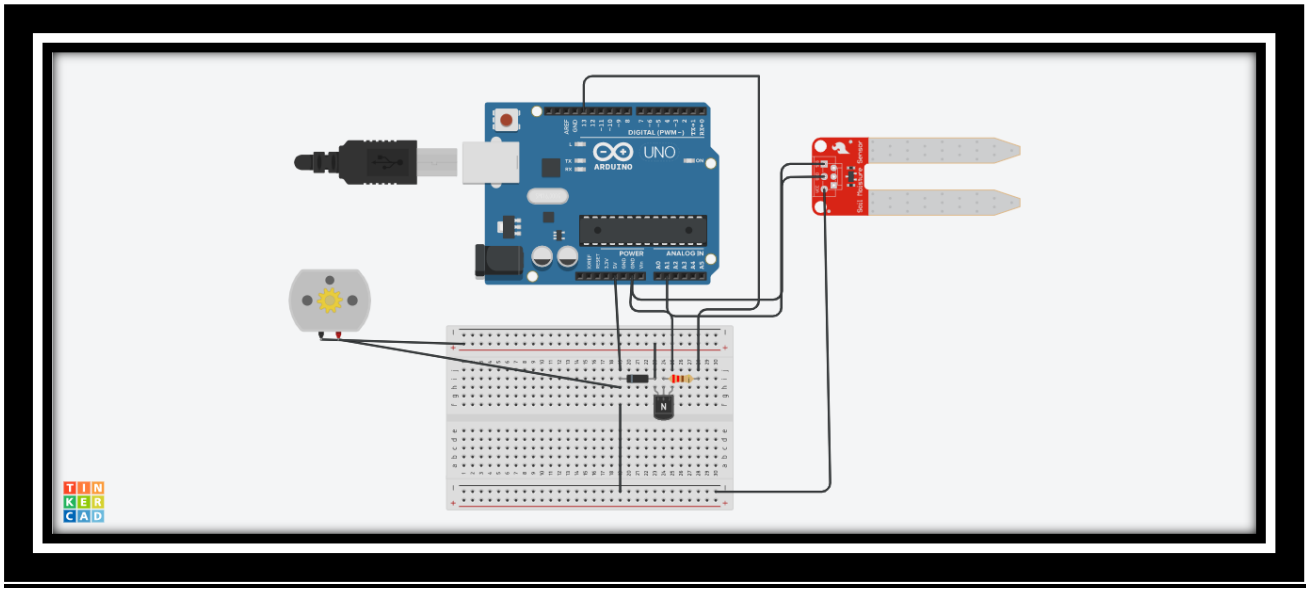
Almost all the Electronics Club website projects started life on a breadboard to check that the circuit worked as intended.

Resistor 221ohm: Resistors act to reduce current flow, and, at the same time, act to lower voltage levels within circuits. In electronic circuits, resistors are used to limit current flow, to adjust signal levels, bias active elements, and terminate transmission lines among other uses.

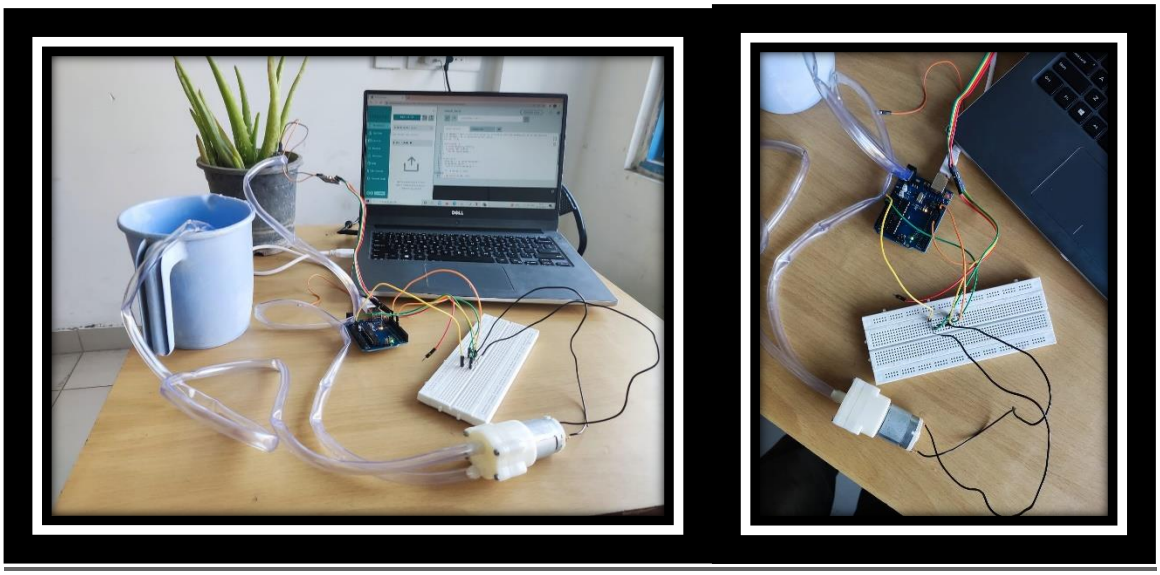
Male/Female jumper wires: Male to female jumper wires used in connecting the female header pin of any development board to other development boards having a male connector. They are simple wires that have connector pins at each end allowing them to be used to connect two points to each other.

Water tubes: These are connected to motor to allow water to flow directly from water container to the soil of the garden.

CIRCUIT DIAGRAM:



FIGURES:



EXPLANATIONS:

In this project we have developed an automatic water gardening system in which we have a soil moisture sensor to sense the moisture content in the form of volume of water present in the soil. If the moisture of the soil is quite high then there is no signal being send by the moisture sensor but if the moisture content of the soil I low then it will send the signal to pump out water from the water container using motor being connected and water is pumped through the soil for 10 to 15 sec until the next signal being send by the sensor that enough water has been supplied. So, this is basic functioning of our whole project.

RESULTS:

From this work, we can control the moisture content of the soil of cultivated land. According to soil moisture, water pumping motor turned on or off via the relay automatically. This saves water, while the water level can be obtained in a preferred aspect of the plant, thereby increasing productivity of crops. Servo motor from vegetation water uniformly dispersed in water, in order to ensure the maximum utilization of absorption through. Thus, there is minimal waste of water. The system also allows the delivery to the plant when needed based on the type of plant, soil moisture, and observed temperature. The proposed work minimize the efforts of major agricultural regions. Many aspects of the system can be customized and used software to fine-tune the requirements of the plant. The result is a scalable, supporting technology. Using this sensor, we can see that the soil is wet or dry. If it is dry, the motor will automatically start pumping water.

CONCLUSIONS:

Thus the "Automatic Irrigation System " has been designed and tested successfully and was developed by integrated features of all the hardware components used . Automatic system using a microcontroller, moisture sensor and other electronic tools were been developed. It was observed that the proposed methodology controls the moisture content of the soil of

cultivated land. The motor automatically start pumping water if the soil is dry and need water and stops when the moisture content of the soil is maintained as required.

FURTHER APPLICATIONS:

Using the Arduino UNO board, you can water six different potted plants. By adding a few more lines in the code, you can water even more plants—by using the Arduino Mega 2560 board which has more analogue input pins.

You can also add an Ethernet or Wi-Fi shield and use the Twitter library, which will tweet from your plants side to send messages like: I need water, the tank is empty, refill the tank, thanks for the water, and so on. A 16×2 LCD can be added to indicate moisture levels.

You can also enable the circuit to refill the tank after a few days, depending on the volume of the tank.

IEEE REFERENCES:

2019 International Conference on Vision Towards Emerging Trends in Communication and Networking (ViTECoN).

[1] Lala Bhaskar, BarkhaKoli, Punit Kumar, Vivek Gaur, “Automatic Crop Irrigation System”, IEEE, Noida, India, 2015

[2] Abhishek Gupta, Shailesh Kumawat,Shubham Garg,“Automatic Plant Watering System”,IJIR,Jaipur, India,2016

[3] Archana P, Priya R, “Designand Implementationofautomatic plant watering system”,IJAEGT,Coimbatore, India,2016

[4] Tasneem Khan Shifa,“Moisture Sensing Automatic Plant Watering System Using Arduino Uno”,AJER, Bangladesh,2018